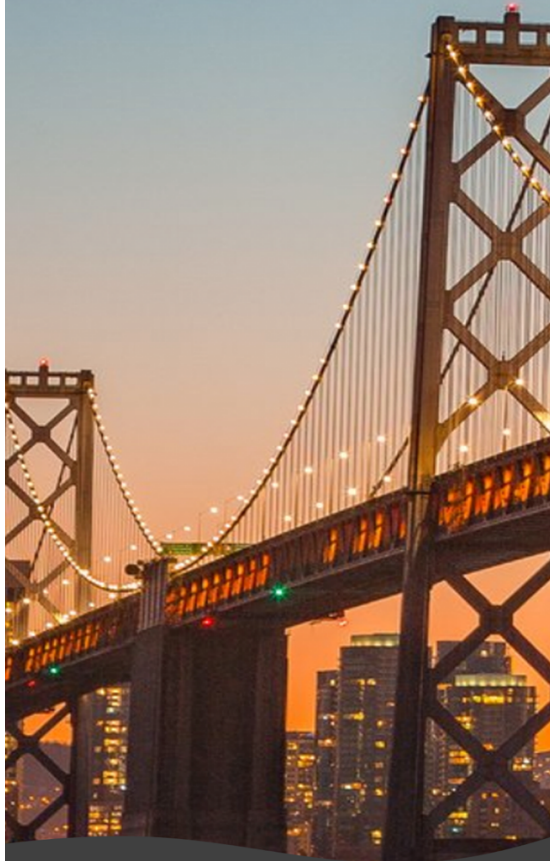




2024 IEDM Conference Theme
**Shaping Tomorrow's
Semiconductor Technology**



For More Information

IEDM Online: ieee-iedm.org

Social Networks:
ieee-iedm.org/social-media



2024 IEEE International Electron Devices Meeting

December 7-11, 2024
Hilton San Francisco Union Square
San Francisco, California

Call for Papers

Submission deadline: July 11th
Single submission of final, four-page paper

Topics

- Neuromorphic computing / compute in memory / AI
- In-memory computing
- AI including deep learning, neuromorphic computing, new compute paradigms
- Quantum computing devices
- Devices for RF, 5G/6G, THz and mm-wave
- Advanced memory technologies
- Advanced logic technology platform and its diversified applications
- Novel materials and innovative applications for next generation devices
- Non-charge-based materials, devices and systems
- Advanced power devices, modules and systems
- Sensors, MEMS and bioelectronics
- Implantable and wearable devices
- Devices/circuits/system interaction
- Advanced packaging, and package-device level interactions
- Device simulation and modeling for emerging technologies
- Reliability of electronic devices and systems
- Optoelectronics, displays and imaging systems

Meeting Highlights

Three plenary presentations by prominent experts.

Special focus sessions covering topics in:

- Emerging Neural Interface Technologies for Human Interface
- AI Memory: Technology and Architecture
- Leading Semiconductor Products and Advanced Packaging
- Emerging Power Electronic Devices and Integration for a Sustainable Society
- IEDM's Finest Innovations: A Retrospective Leading to the Future

Evening Panel Discussions

Six tutorial sessions on Saturday, December 7th

Two short courses on Sunday, December 8th

Exhibits on December 9th – 11th

Papers in the Following Areas Are Requested

ADVANCED LOGIC TECHNOLOGY (ALT): Papers are solicited in the areas of CMOS platform technologies and applications (e.g., HPC, LOP, mobile, automotive, low-temperature CMOS, etc.), logic devices and circuits, process integration schemes for advanced nodes, innovations in material, process and metrology techniques, and design technology co-optimization (DTCO) and system technology co-optimization (STCO). Platform technologies include state-of-the-art Si and beyond-Si channel devices, gate-all-around devices, stacked devices with different polarity transistors, advanced interconnect, novel power distribution integration schemes, heterogeneous 2.5D/3D integration schemes, and BEOL compatible transistors. Device architecture, device design and analysis, process integration, module advancements in process and patterning, metrology, physical layout effects, techniques for reduced variability, yield, thermal management, methodologies, and solutions for DTCO/STCO in the solicited areas are of high interest.

EMERGING DEVICE and COMPUTE TECHNOLOGY (EDT): Papers are solicited on emerging nano-electronic devices and physics. This includes devices based on novel transport and control mechanisms such as tunnel FET, negative capacitance FET, cold-source FET, cryogenic devices, topological materials and devices, phase transitions, ferroelectrics and quantum effects. Devices based on low-dimensional systems including 2D materials, CNTs, nanowires, single electron transistors and quantum dots are welcomed. Exploratory devices with novel device functions and/or novel materials for neuromorphic compute, approximate and analog compute, and non-charge-based compute such as spintronics are key topics. Furthermore, emerging state machines and time dynamical compute systems are also of interest. Qubit devices as well as devices and systems designed to enable quantum computing, quantum simulation and quantum annealing are of high interest. Papers in EDT focus primarily on device physics and novel elaboration concepts.

MEMORY TECHNOLOGY (MT): Papers are solicited across various domains in memory and storage technologies. This encompasses advancements and scaling in established technologies like SRAM, DRAM, and Flash, as well as breakthroughs in emerging innovations such as MRAM, PCM, FRAM, RRAM, ECM, Cross-Point memory, organic memory, and NEMS-based memory. These include research pertaining to materials and devices for memory and selector in electrostatic and atomistic switching mechanisms, as well as the design and implementation of memory cells and arrays in 3D constructs, including stacking and tiering, alongside read/write access mechanisms. Additionally, submissions of novel approaches to homogeneous or heterogeneous integration and manufacturing techniques of memory in semiconductor fabrication or packaging assembly are welcome. Authors are also invited to present papers focusing on reliability characterization and physics exploration, as well as improvements through manufacturing and usage algorithm, such as wear leveling. Furthermore, contributions addressing the span-expanding and gap-bridging of tiering and hierarchy in memory subsystem are encouraged, as are those addressing memory subsystems tailored to a broad spectrum of computing needs, ranging from mobile to large-scale platforms for client to cloud computing, encompassing both general-purpose and AI-based architectures. Papers disclosing novel physics and computing architecture may be transferred to other technical sections such as EDT or NC at the discretion of the committee.

POWER, MILLIMETER WAVE and ANALOG TECHNOLOGY (PMA): Contributions are sought on novel circuit topologies, manufacturing processes, supporting modeling (TCAD and compact models), device physics, reliability, and materials (Si, III-Vs, SiC, (Al)GaN, Ga₂O₃, AlScN, LiNbO₃, diamond, LTO, etc.) along with fundamental studies on doping, deep-level traps, interface state densities, and device reliability for power and/or high frequency devices. Papers are solicited on discrete and integrated power and/or high frequency (micro, mm-wave and THz) devices and physics, modules and systems. Topics of interest include devices (diodes, BJTs, FETs, super-junction devices, heterostructures, IGBTs, HEMTs, HBTs, light-triggered structures for galvanic isolation and faster switching, bi-directional switches, vertical geometry devices, RF acoustic resonators, SAW and BAW filters etc.) and device/package/circuit interactions, including thermal management. Wide variety of applications are also of interest (power conversion, supply, regulation and conditioning for computers and data centers, motor drives, transportation, solar, wind, smart grid applications, wireless power harvesting/transfer, filters, beam formers, power amplifiers, tunable passives, antenna arrays).

MODELING and SIMULATION (MS): Papers are solicited on theoretical approaches to electronic devices, including logic, memory, optical components, interconnects, and (bio)sensors. Theoretical approaches include analytical, numerical, statistical, and machine-learning/AI-based methods applied to structures ranging from atomistic to device dimensions, and up to full-chip dimensions, including physics-based compact modeling. Central to submissions is the innovation of devices, whether through predictive insight into novel device concepts, predictive analysis demonstrating significant device improvements, breakthroughs in theoretical understanding of device operation, advancements in knowledge of device processing facilitating enhanced device performance, novel insights into variability, reliability, and yield issues, or breakthroughs in device optimization based on DTCO. Topics also include ab-initio/atomistic materials modeling, neuromorphic computing modeling, quantum computing, spintronics, low-dimensional devices, ferroelectrics, thermal modeling, 3D/heterogeneous integration, and electro-chemical/mechanical devices. Encouragement is given for comparison with experimental data, model calibration, and utilization of multi-scale simulation chains.

OPTOELECTRONICS, DISPLAYS, and IMAGING SYSTEMS (ODI): Papers are solicited on optoelectronics, displays, and imaging systems. This includes novel devices, structures, and integration for image sensors, displays, light sources, photonic devices, and high-speed photodetectors and modulators. New technologies on heterogeneous integration of optoelectronics devices as well as on photonic-electronic integration for optical interconnects, on-chip networks and sensing are welcomed. Papers on quantum photonics, neuromorphic photonics, and plasmonics for quantum computation, sensing and encryption are also of interest. Furthermore, ODI includes CMOS imagers, high-speed and high-time resolution imagers, tacked imagers sensors, single-photon sensitivity, Time-Of-Flight and non-visible image sensors. In addition, papers on displays of all types, for augmented or virtual reality, holography, TFTs for photonics applications, flexible, stretchable, and/or printed electronics, in-display sensors are encouraged. Papers on displays or light emitting devices with novel materials such as perovskites or quantum dots are also of interest.

NEUROMORPHIC & NOVEL COMPUTING (NC): Papers are solicited in areas related to memory and logic devices, circuits, and algorithms for new and unconventional compute paradigms, including but not limited to neuromorphic computing and other artificial intelligence (AI) acceleration techniques. This includes, for example, analog/mixed-signal computing, in-memory computing devices and circuits for deep learning, probabilistic computing, bio-inspired computing such as spiking neural networks, reservoir computing, combinatorial optimization, content-addressable memory, etc. Use cases in the datacenter as well as on the edge, e.g. in-sensor computing, are contemplated. Demonstration of novel device concepts improving computational efficiency, full hardware integration, device-algorithm co-optimization to mitigate non-ideal device properties, and real-world applications are of high interest. Papers on near-memory computing may be transferred to MT, and papers centered on optical or quantum computing may be transferred to EDT, at the discretion of the committee.

RELIABILITY of SYSTEMS & DEVICES (RSD): Papers are solicited that focus on the reliability evaluation, both experimental and modeling, of devices dedicated to analog, logic, and memory applications, interconnects, circuits, and systems. In addition to Si-based technologies, authors are encouraged to submit their recent achievements made employing other material systems, such as SiGe, IGZO, ferroelectric materials, 2D materials, etc. The reliability topics include, for FEOL, transistor degradation due to hot carriers, bias temperature instabilities, random telegraph noise, dielectric SILC, and wear-out as well as modeling the aging behavior. For MEOL/BEOL, topics include the breakdown of MEOL spacers and BEOL dielectrics, electromigration, and stress migration failures of contacts and interconnects. For product, system, and circuit reliability, topics include latch-up, ESD, soft error mechanisms, variability-aware design, and design for reliability, robustness, and security of electronic circuits and systems. Of particular interest are investigations of degradation mechanisms for devices, circuits, and systems in the following areas: conventional and emerging memories; beyond CMOS devices; 3D IC package reliability, more-than-Moore applications; biomedical devices and systems; automotive and aerospace.

SENSORS, MEMS, and BIOELECTRONICS (SMB): Papers are solicited in the areas of sensors, micro/nano electromechanical systems (MEMS and NEMS), microfluidics/lab-on-chip, BioMEMS, and bioelectronic devices and systems, with particular emphasis on new device concepts, integrated and highly parallel CMOS implementations, CMOS-on-MEMS, embedded machine learning, organic-inorganic hybrid microfabrication, flexible devices, soft devices, and multimodal sensors on a chip for applications in health, medicine, communication, mobility, and energy. Sensors include chemical, molecular and biological detection based on acoustic, electrical, electrochemical, magnetic, mechanical, and optical principles. Topics of interest in the MEMS area include actuators, physical and biochemical sensors (BioMEMS), resonators, integrated inertial measurement units, RF MEMS, SAW and BAW sensors, optomechanical devices, micro-power generators, and devices for energy harvesting as well as on-chip energy storage. Bioelectronics covers organic-inorganic hybrid devices, point-of-care biomedical devices, bio-electronic interfaces, integrated biomedical sensing, and implantable sensors and neural interfaces.

Preparation of Full Papers

Papers must be submitted electronically in IEEE Xplore-compatible pdf format. The deadline for submission of papers is **July 11th, 2024**. PRIOR to preparing your paper for electronic submission, please read the paper preparation and submission guidelines below. A paper template and sample paper are available at: iee-iedm.org/preparation-of-papers

Papers Must Clearly State

- The purpose of the work
- The manner and degree to which it advances the art with proper references
- Specific new results that have been obtained with clear experimental (description of the work) conditions and their significance

The degree to which the paper deals with these issues will strongly affect whether the paper is accepted. The most common cause of rejection of submitted papers is a lack of specific results. Only those work that has not been previously published at the time of the conference will be considered. Paper acceptance will be based solely on the information provided on the four-page paper submitted. Promises of upcoming results will be ignored. All submissions will be checked for plagiarism.

Electronic Submission

Only electronic submissions through the paper submission system linked to the conference website will be accepted. Do not email files to the conference office. In order for your paper to receive a full review, the following information MUST be entered on the website along with your submission:

- Title of paper
- Name, complete mailing address and phone, and email of first author
- Names, affiliations, city, state, country of additional authors
- Person to whom correspondence should be sent, if other than the first author
- Identification as invited or student paper and student travel request, if applicable
- Suggested area (as listed in this announcement) into which the paper fits
- 50-word abstract

Papers Must Include

- Title of paper
- Name, complete mailing address, phone, and email of first author and name, affiliation, city, state and country of additional authors.
- 4 pages of two pages of text and two additional pages of figures and drawings (no text, captions only) in 8-1/2" x 11" format describing the planned 20-minute paper and emphasizing the findings. The font size for the body of the text and in figures and captions must be at least 10 point.
- Excessive photo reduction, poor legibility, and use of arbitrary units in figures may negatively impact acceptance.
- Papers with more than 2 pages of text or figures shall be grounds for immediate rejection.
- Please avoid the use of special international fonts.

50-Word Web Page Abstract

This abstract is a brief synopsis (50 words) of your paper. Accepted 50-word abstracts will be used in preparing the IEDM web pages. The abstract should be prepared and provided during the submission process in the requested text field on the submission web site. DO NOT INCLUDE the 50-word abstract as a separate page with your submission.

For questions contact the conference office: iedm-info@ieee.org

Notification of Acceptance

Authors of accepted papers will be notified by the end of September. The accepted paper will be published as-is in the Technical Digest of the 2024 IEDM. Publication in the digest in no way precludes later publication of a fuller account of the work in another journal, but NO PUBLICATION is acceptable before the conference. The paper must be presented at the conference by one of the listed authors. All presentations will be in-person, no exceptions. Along with uploading your PowerPoint presentation in the speaker-ready room at the conference, all speakers must upload an MP4 file of their video via the speaker dashboard no later than **November 21**. The file will be used for the OnDemand portion that will be available post-conference.

Student Presentation of Papers Encouraged

Papers presented by students and based on their own work will be considered for the Best Student Paper Award. The paper must be identified as a student paper at the time of submission. The award is based on both the paper and the presentation which must be given by the student. The award will be announced and presented at the 2024 IEDM.

Student Speaker Financial and Travel Assistance

Financial assistance for travel and registration is available to students presenting papers. This applies also for overseas students. Assistance must be requested when the paper is submitted by choosing this option on the submission website (under "Type"). Further information on travel assistance will be included in the student's author kit. Late News Papers are not eligible for travel assistance or the student paper award.

Pre-Conference Publicity

The accepted 4-page papers and supporting information will be used by IEDM for publicity and portions of these papers may be quoted in pre-conference magazine articles and also via the Web. **If this is not acceptable, authors must indicate this on the website when submitting the papers for review.** Questions regarding pre-conference publicity should be addressed to the conference public relations managers:

Chris Burke cburke@btbmarketing.com 1-919-872-8172

Gary Dagastine gdagastine@nycap.rr.com 1-518-785-2724

Agreement Not to Pre-Publish

Submission of a paper for review and subsequent acceptance is considered by the committee as an agreement to the IEEE submission policy that the work will not be published by the author prior to the conference. Accepted papers or significant portions of the work must not be published in any other conference presentations with or without proceedings prior to the conference. Violation will be grounds for automatic withdrawal of the paper by the conference committee.

Late News Papers

Deadline for receipt of papers is August 19th, 2024.

A very limited number of Late News Papers will be accepted. Late News Papers are not eligible for travel assistance or the student paper award.

Authors are asked to submit late news papers announcing only very recent developments. Papers should be in the same format as a regular paper and should be submitted through the submission web site in the same way as for regular submissions. Authors of accepted papers will be notified by the end of September.

For Further Information

All questions or inquiries for further information regarding this meeting should be directed to the Conference Office at:

Email: iedm-info@ieee.org

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